



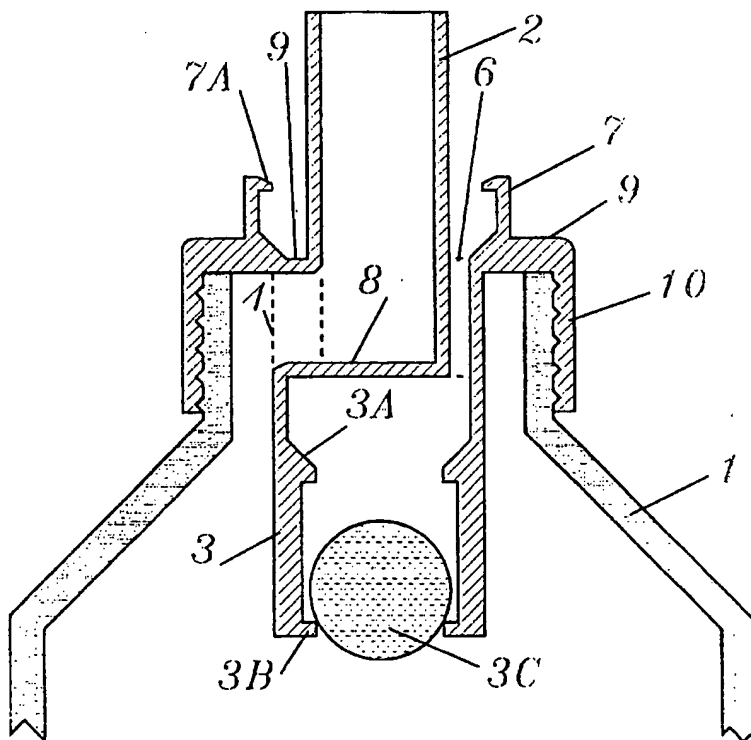
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(21) International Application Number: PCT/SE93/00961 (22) International Filing Date: 11 November 1993 (11.11.93) (71)(72) Applicants and Inventors: LINDHOLM, Per [SE/SE]; Segersång 16, Gräninge, S-148 00 Ösmo (SE). LINDHOLM, Rolf [SE/SE]; Hedstigen 24, S-148 71 Sorunda (SE). LINDHOLM, Lars [SE/SE]; Kristinehamnsgatan 62, S-123 44 Farsta (SE). (74) Agents: ROSENQUIST, Per, Olof et al.; Bergenstråhle & Lindvall AB, P.O. Box 17704, S-118 93 Stockholm (SE).		(81) Designated States: AT, AU, BB, BG, BR, BY, CA, CH, CZ, DE, DK, ES, FI, GB, HU, JP, KP, KR, KZ, LK, LU, LV, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SK, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>In English translation (filed in Swedish).</i>

(54) Title: POURING SPOUT

(57) Abstract

Discharge means for liquid containers intended to prevent liquid spillage and facilitate supply of air during discharge, comprising a discharge pipe (2) for liquid with a base (9) to be mounted adjacent a container opening (1), a rim (7) arranged on the base and surrounding the discharge pipe, channels (6) opening between rim and discharge pipe for return liquid and air supply, as well as outlet ports (4) for liquid connected to the discharge pipe for liquid, separately arranged from the channels (6) for liquid return and air supply, wherein the channels (6) for return liquid and air supply open into a valve housing (3) comprising a valve element (3c) arranged movably between an upper valve seat (3a) and a lower valve element stop (3b), inlet slits (5) for air and return liquid are arranged in the valve housing (3) in order to establish communication between the interior of the container (1) and the channels (6) opening into the valve housing, whereby the valve element (3c) is arranged to obstruct said communication when the valve element rests in the valve seat (3a) and to be lifted from the valve seat (3a) by air streaming in (arrows B) during discharge of liquid (arrows A).



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Pouring spout

This invention relates to a discharge means for a liquid container intended to prevent liquid spillage and to facilitate the entrance of air when discharging liquid.

Background of the invention

The problem with drops flowing down along the outside of containers for different liquids after discharge of liquid has occupied many people and several solutions have also been presented. On example of a common solution is disclosed in US,A,4,193,519 wherein a central pouring spout is surrounded by a chute and with connecting channels between the chute and the interior of the container. One disadvantage with this solution is that the connecting channels are narrow, which among other things means that the passage of air into the container during discharge is obstructed. Further, when the bottle is used several times in short intervals, there is a risk for that, when the bottle is tilted anew, the liquid which has been collected in the chute and which has not had time to flow back into the bottle will flow out over the edge of the chute and still will end up on the outside of the bottle.

Another problem in the solutions hinted at above is the size of the chute. If the chute is too narrow drops may stay there and not flow down into the chute and the next time the bottle is tilted they will strive over to the outside of the container. If, however, the chute is wide and at the same time the connecting channels between the chute and the interior of the bottle for obvious reasons cannot be made correspondingly large, once again there is a risk for that liquid remaining in the chute will flow over the edge and end up on the outside of the bottle when it is used the next time.

Short description of the invention

One object of this invention is to provide a discharge means, in which liquid drops are prevented to end up on the outside of the container after discharge but instead are returned to the container.

Another object is to provide a discharge means with which the

supply of air to the container vessel in question is facilitated during discharge.

This is achieved with the discharge means according to the invention, comprising a discharge tube for liquid with a base to be mounted adjacent to a container opening, a rim surrounding the discharge tube mounted on the base, channels opening between rim and discharge tube for liquid return and air supply, as well as outlet ports for liquid communicating with the liquid discharge pipe, characterized in that the outlet ports are arranged separately from the channels for return liquid and air supply, in that the channels for return liquid and air supply open into a valve housing comprising a valve element movable between an upper valve seat and a lower valve element stop, in that inlet slits for air and return liquid are arranged in the valve housing in order to establish communication between the interior of the container and the channels for return liquid and air supply opening into the valve housing, whereby the valve element is arranged to obstruct said communication when the valve element lies in the valve seat. With this arrangement of the discharge means the return channels can, due to the valve operation, be made substantially larger compared to known devices, and thereby the return of liquid as well as the air supply to the container is substantially facilitated.

According to one embodiment of the invention the valve element is arranged to be lifted from the valve seat by air streaming-in during the discharge of liquid.

According to another embodiment of the invention the valve element is arranged to rest against the valve element stop in the resting position and thereby leaving the communication between the channels for liquid return and air supply and the inlet slits for air as well as returning liquid open.

According to a further embodiment of the invention the valve element is ball-shaped.

According to a further embodiment of the invention the number of outlet ports is at least three.

According to a further embodiment of the invention the number of inlet slits is at least three.

According to a further embodiment of the invention the number of channels for liquid return and air supply is at least three.

According to a further embodiment of the invention the rim has an upper shoulder, directed inwardly towards the discharge pipe.

According to a development of the invention the valve housing is arranged at an angle to the vertical axis of the liquid container while at the same time the pouring direction is determined in order to obtain a quicker sealing against the valve seat. This is especially important with large flows of thin liquids.

Short description of the drawings

In the accompanying drawings, a preferred embodiment of the discharge means according to the invention is shown, wherein

- fig. 1 shows a schematic sectional view of the device according to the invention, mounted on a bottle in an upright position,
- fig. 2 shows a schematic sectional view of the device according to the invention, unassembled, taken in another plane compared to in fig. 1,
- fig. 3 shows a schematic sideview of the valve housing with an outlet port for liquid and a slit for letting in air and return liquid,
- fig. 4 shows the bottom of the discharge pipe seen from underneath with channels for return liquid and air supply,
- fig. 5 shows the pouring means seen from above,
- fig. 6 shows a bottle tilted into pouring position with a mounted discharge means, at the beginning of discharge,
- fig. 7 shows the bottle at a later stage of discharge compared to in fig. 6, showing the supply of air,
- fig. 8 shows the bottle after the end of the discharge,
- fig. 9 shows an example of a sealing/cap, and
- fig. 10 shows an alternative embodiment of the invention with a valve housing in an angular position.

Description of a preferred embodiment

The invention will now be described in connection with the preferred embodiment shown in the drawings.

In fig. 1 the discharge means according to the invention is shown mounted on a schematically drawn bottle 1. The discharge means comprises a discharge pipe 2 for liquid. Axially aligned with the discharge pipe 2 a valve housing 3 is arranged with an upper ball seat 3a and a ball stop 3b. In the valve seat a ball 3c is arranged, acting as a movable valve element, the functions of which will be described more in detail below.

The discharge pipe communicates with the interior of the bottle through outlet ports 4 while air can stream into the bottle during discharge through slits 5 in the lower part of the valve seat and the channels 6 for return liquid and air supply. Around the discharge pipe 2 a secondary liquid barrier is arranged in the form of a rim 7, suitably designed with a shoulder 7a directed inwardly, for collecting droplets. Above the valve seat 3 a partition wall 8 is arranged, forming the bottom of the discharge pipe.

The valve housing 3 is part of a pipe formed element having a base 9 intended to be sealingly connected to the upper part of the bottle 1 or similar container. The liquid barrier 7 is arranged on the top side of the base. The roof of the valve housing is comprised of said partition wall 8. The part of the pipe-formed element lying above the partition wall 8 with the outlet ports 4 therein is a continuation of the discharge pipe 2.

In the embodiment shown the discharge means comprises a threaded sleeve 10 made integrally with the base 9 for threading onto a standard thread of a bottle. Of course other mounting devices can be used. For example the discharge means can be arranged for permanent attachment on a liquid container or it can be designed to be snapped onto an opening of a container.

In fig. 2 the discharge means is shown unassembled, in a sectional view, taken from another angle compared to the section according to fig. 1, whereby an outlet port 4 for liquid is also shown.

The schematic view in fig. 3 shows an outlet port 4 as well as an inlet slit 5 for air and for return of liquid, arranged in the lower part of the valve housing. The slits are so designed that the valve element 3c leaves the connection between said slits and the return channels 6 open when it is situated on the

stop 3b, but disrupts said connection while it is situated on the valve seat 3a.

In fig. 4 the bottom 8 of the discharge pipe 2 is shown from below with the channels 6 for return liquid and air supply. In the embodiment shown three channels 6, arranged uniformly, are shown. Of course another number of channels can be used.

In fig. 5 the discharge means is shown from above. The discharge pipe 2 is placed centrally and closest to this are the channels 6 for return liquid and air supply. The rim with its shoulder 7a surrounds the channel area and outside that lies the edge part of the rim 9.

The function of the invention

The function of the invention will now be described more closely in connection with figs. 6 and 7.

When tilting the bottle 1 according to fig. 6 the liquid will flow out through the three outlet ports 4, of which only one is shown in the figure and further, out through the discharge pipe 2, as is indicated with arrows A. In this phase the ball 3c sealingly rests against the valve seat 3a, so that liquid cannot pass out through the channels 6 for return liquid.

When sub-atmospheric pressure arises in the bottle 1 the ball 3c will be lifted up by the air pressure sufficiently enough to let the air necessary to even out the pressure, which is shown with arrows B in fig. 7. The supply of air to the interior of the bottle takes place through the channels 6 through the ball valve 3 and in through the inlet slits 5. In this position the liquid is prevented from flowing out by the air streaming in.

When the bottle 1 then is raised to the position shown in fig. 8 normally at least one drop remains on the discharge pipe 2. This or these drops will flow outside the discharge pipe 2 through the channel/channels 6 through the ball valve, where the ball now rests against the ball stops 3b, and back to the bottle through the return slits 5, as is shown with arrows C.

If the return liquid does not have time to flow back before next discharge the space underneath the shoulder 7a will form a temporary collecting spot until the bottle is raised to an upright position again.

Advantages and developments of the invention

The discharge means is thus provided with a valve, where the ball 3c seals the return openings 6, e.g. when heavily tilting the container. This means that these openings could be made much bigger than what would be possible otherwise, which in turn means that the liquid return and the supply of air is substantially facilitated.

Fig. 9 shows an example of a seal/cap. The discharge mean is provided with a collar 10 and a removable transport safety device 11 which can easily be removed. Thereafter the seal 12 is used, which can be provided with either a thread or a shoulder 13.

Fig. 10 shows a development of the invention which is especially well suited for large flows of thin liquids. In order to obtain a quicker sealing the valve housing 3' is arranged in an angular position, e.g. 40°, in relation to the vertical axis of the container. Hereby it is important that the pouring direction is given in order for the device to work properly. In the embodiment shown this is achieved by the discharge means being arranged non-symmetrically on the container. Further the discharge pipe 2' is cut obliquely in order to indicate the pouring direction even more clearly. Optionally only the oblique cutting could be used to define the pouring direction where smaller containers are concerned.

It is also possible to form the discharge pipe in other ways, such as in the form of a chute, arranged obliquely in the pouring direction, etc.

Alternatively or as a complement the container can be made with a grip or a handle part which makes the pouring direction automatically correct.

CLAIMS

1. Discharge means for liquid containers intended to prevent liquid spillage and facilitate supply of air during discharge, comprising a discharge pipe (2) for liquid with a base (9) to be mounted adjacent a container opening (1), a rim (7) arranged on the base and surrounding the discharge pipe, channels (6) opening between rim and discharge pipe for return liquid and air supply, as well as outlet ports (4) for liquid connected to the discharge pipe for liquid, separately arranged from the channels (6) for liquid return and air supply, **characterized in that** the channels (6) for return liquid and air supply open into a valve housing (3) comprising a valve element (3c) arranged movably between an upper valve seat (3a) and a lower valve element stop (3b), in that inlet slits (5) for air and return liquid are arranged in the valve housing (3) in order to establish communication between the interior of the container (1) and the channels (6) opening into the valve housing, whereby the valve element (3c) is arranged to obstruct said communication when the valve element rests in the valve seat (3a) and to be lifted from the valve seat (3a) by air streaming in (arrows B) during discharge of liquid (arrows A).

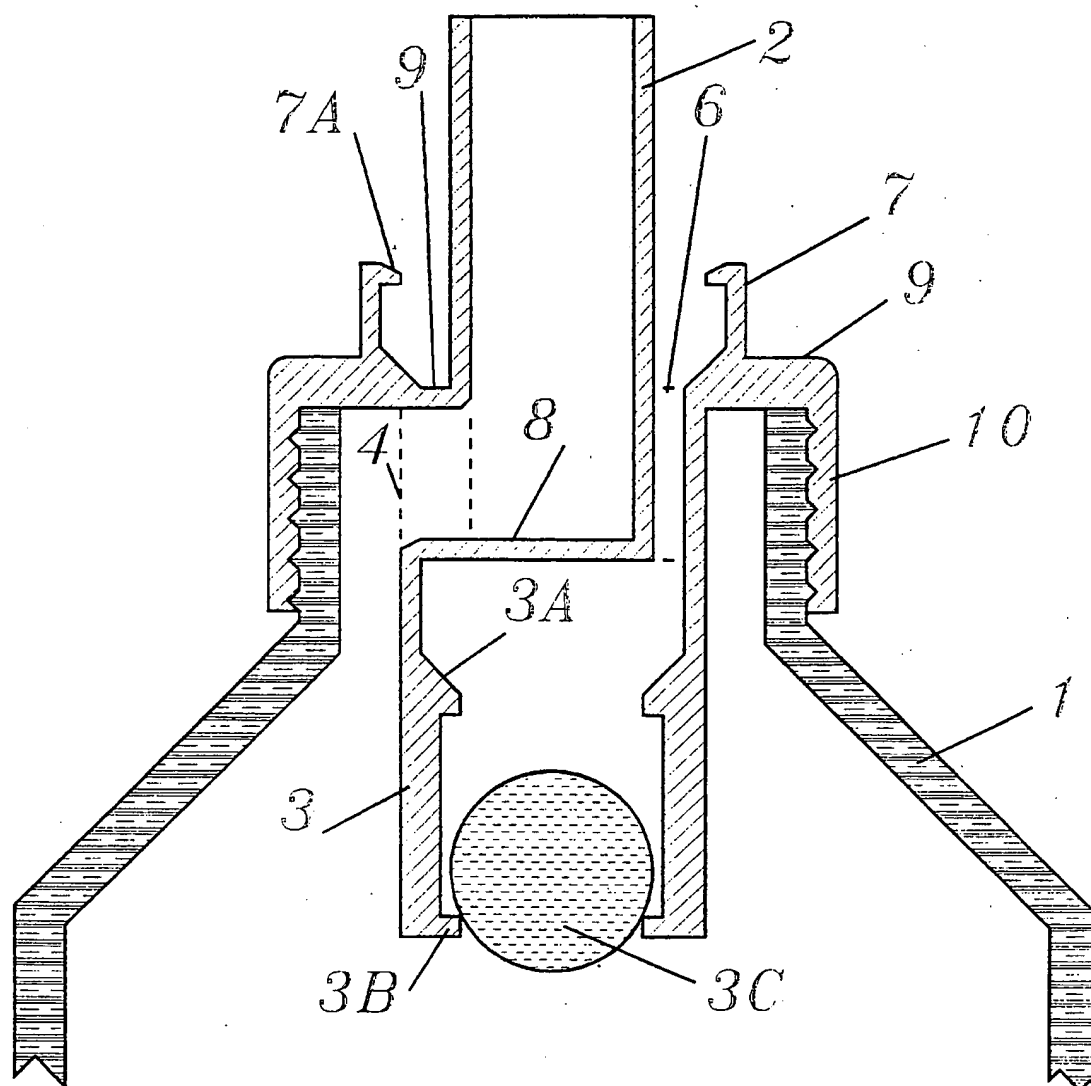
2. Means according to claim 1, **characterized in that** the rim (7) has an upper shoulder (7a), directed inwardly towards the discharge pipe (2).

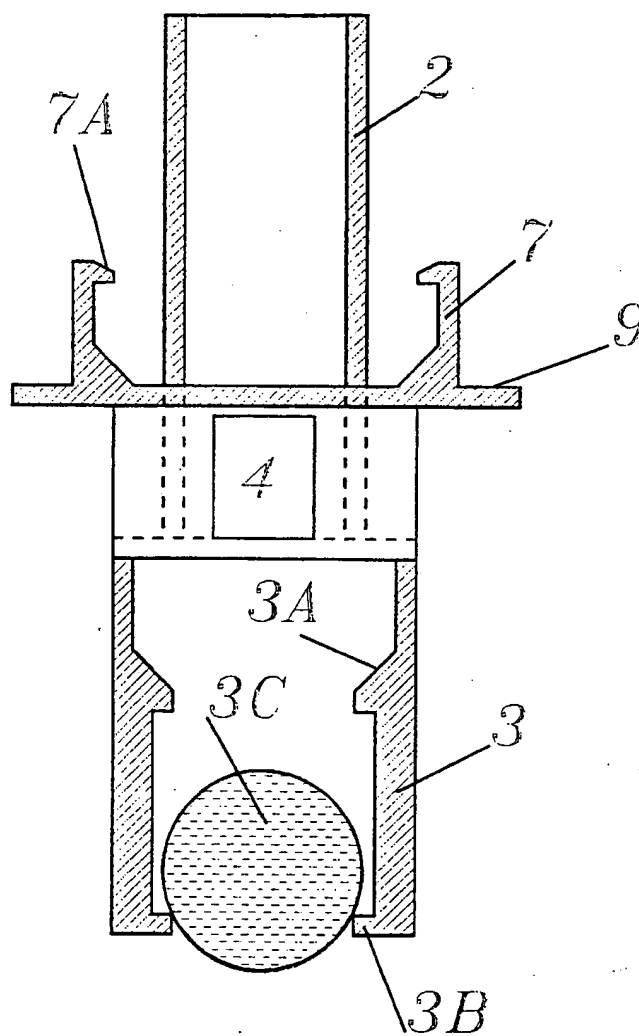
3. Means according to claim 1 or 2, **characterized in that** the valve housing (3') is arranged at an angle in relation to the vertical axis of the liquid container (1') in order to result in a quicker sealing against the valve seat at discharge.

4. Means according to claim 3, **characterized in that** the discharge means is arranged non-symmetrically on the container in order to automatically give a decided pouring direction opposite to the angular direction of the valve housing (3').

5. Means according to claim 3 or 4, **characterized in that** a handle is arranged or formed on the liquid container in order to

give a decided pouring direction.

*Fig 1*

*Fig 2*

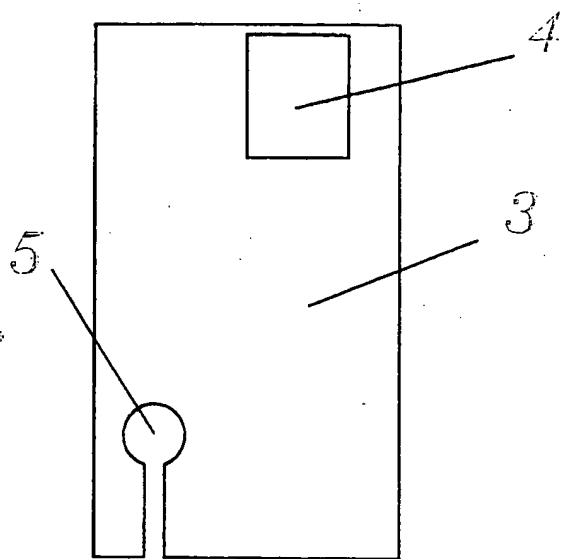


Fig 3

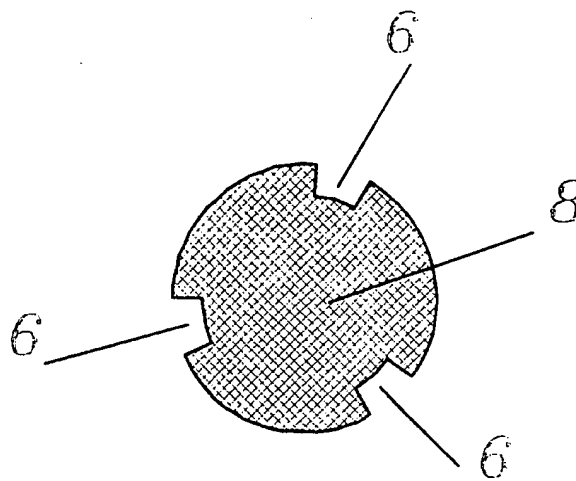


Fig 4

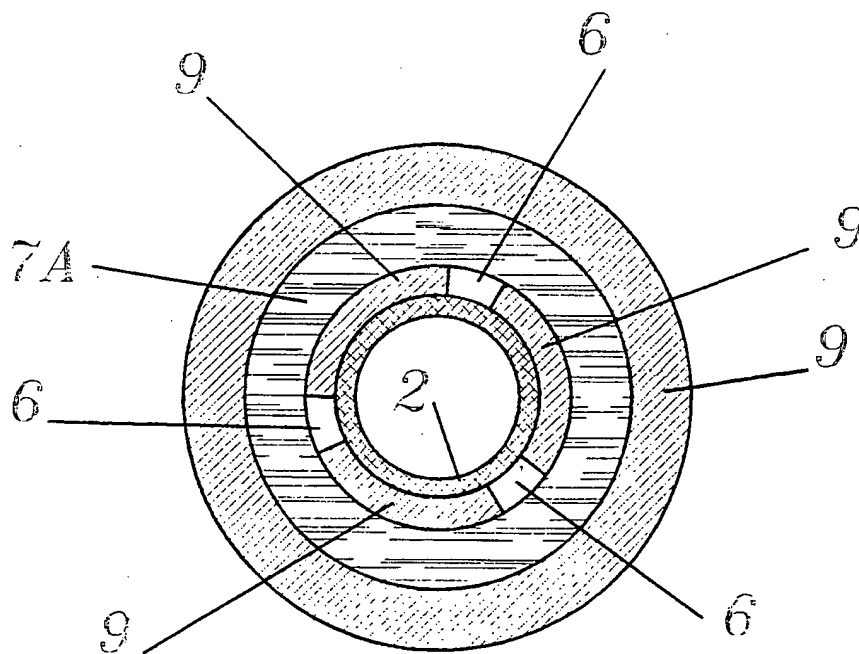
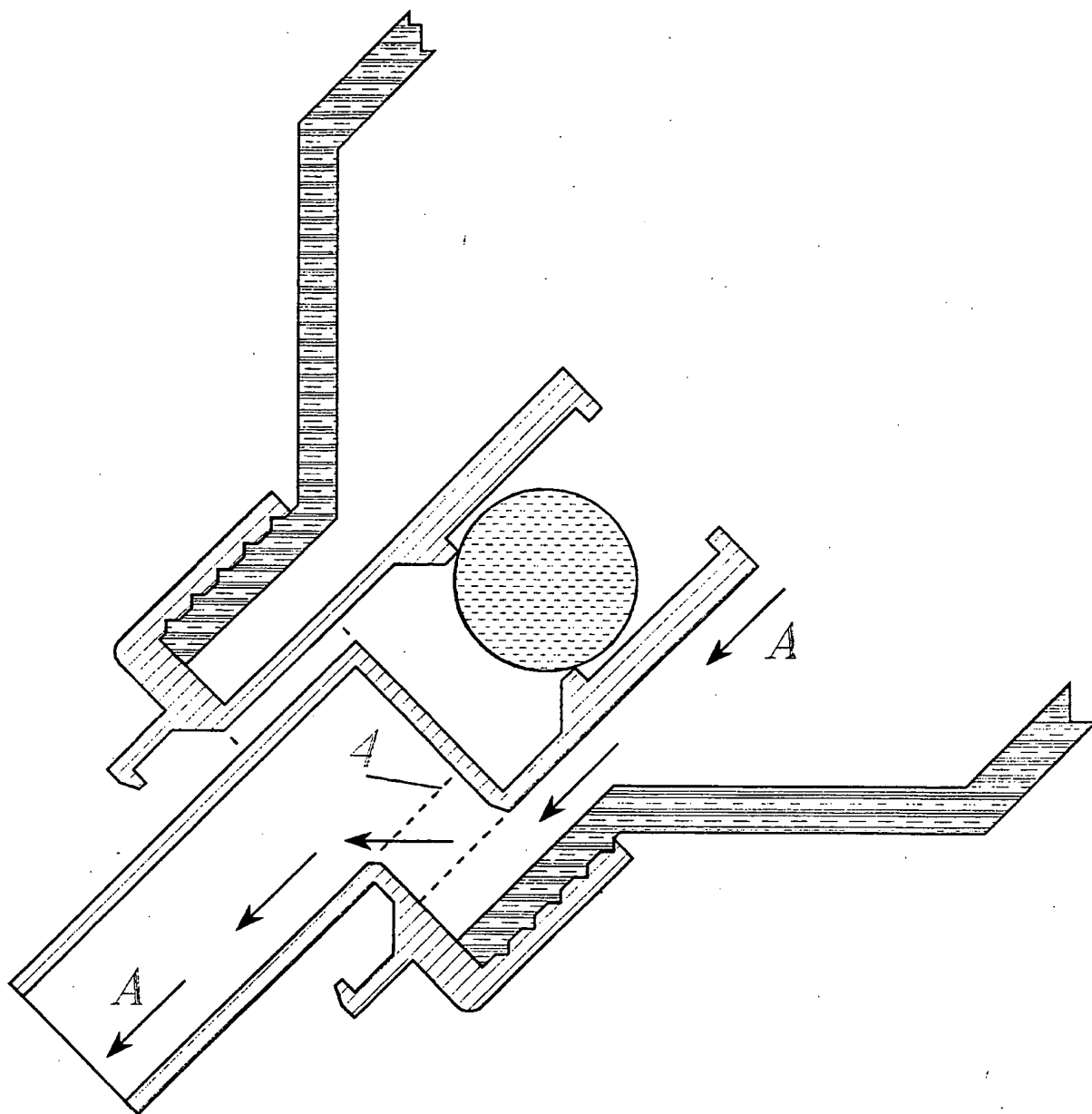


Fig 5

*Fig. 6*

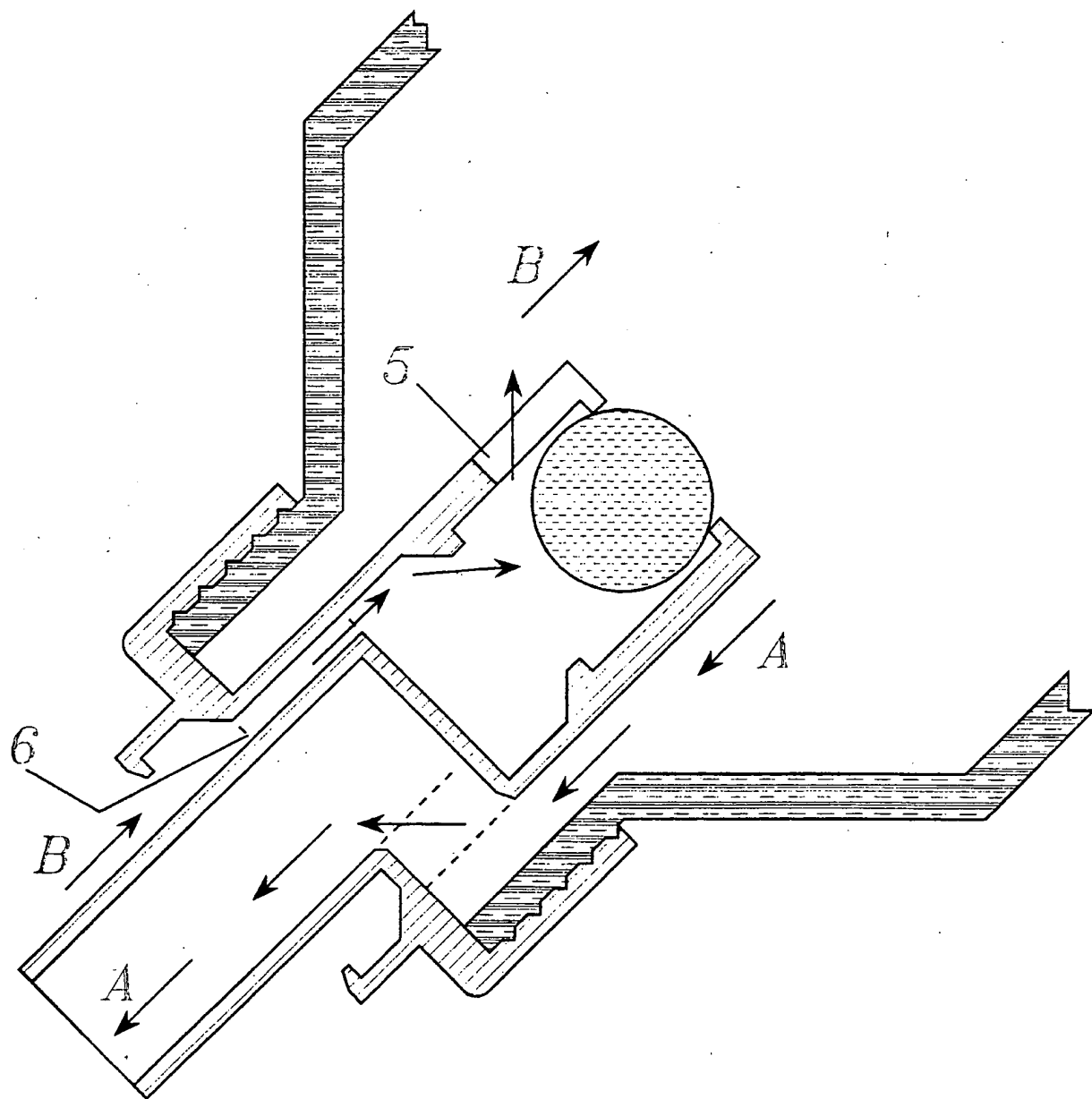
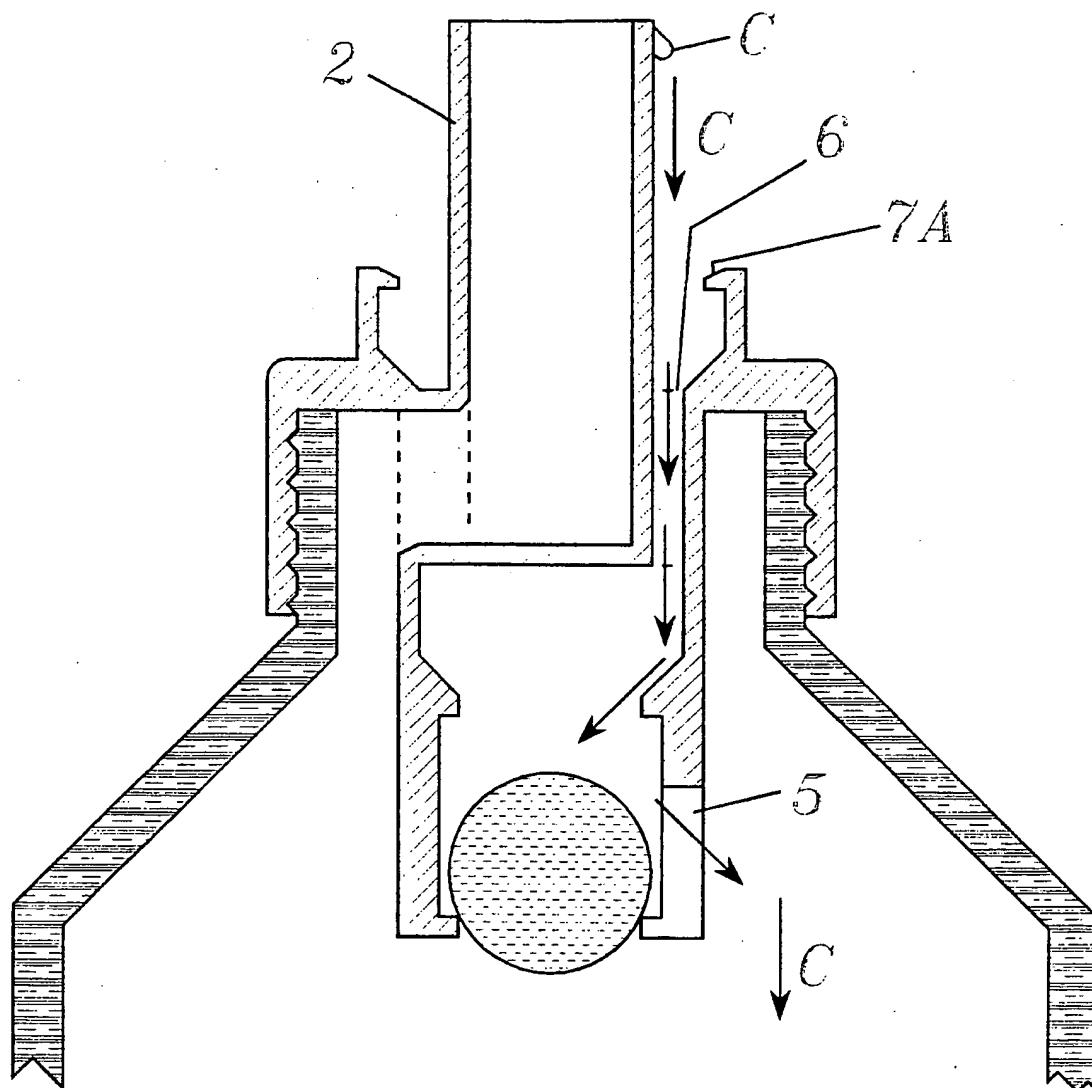
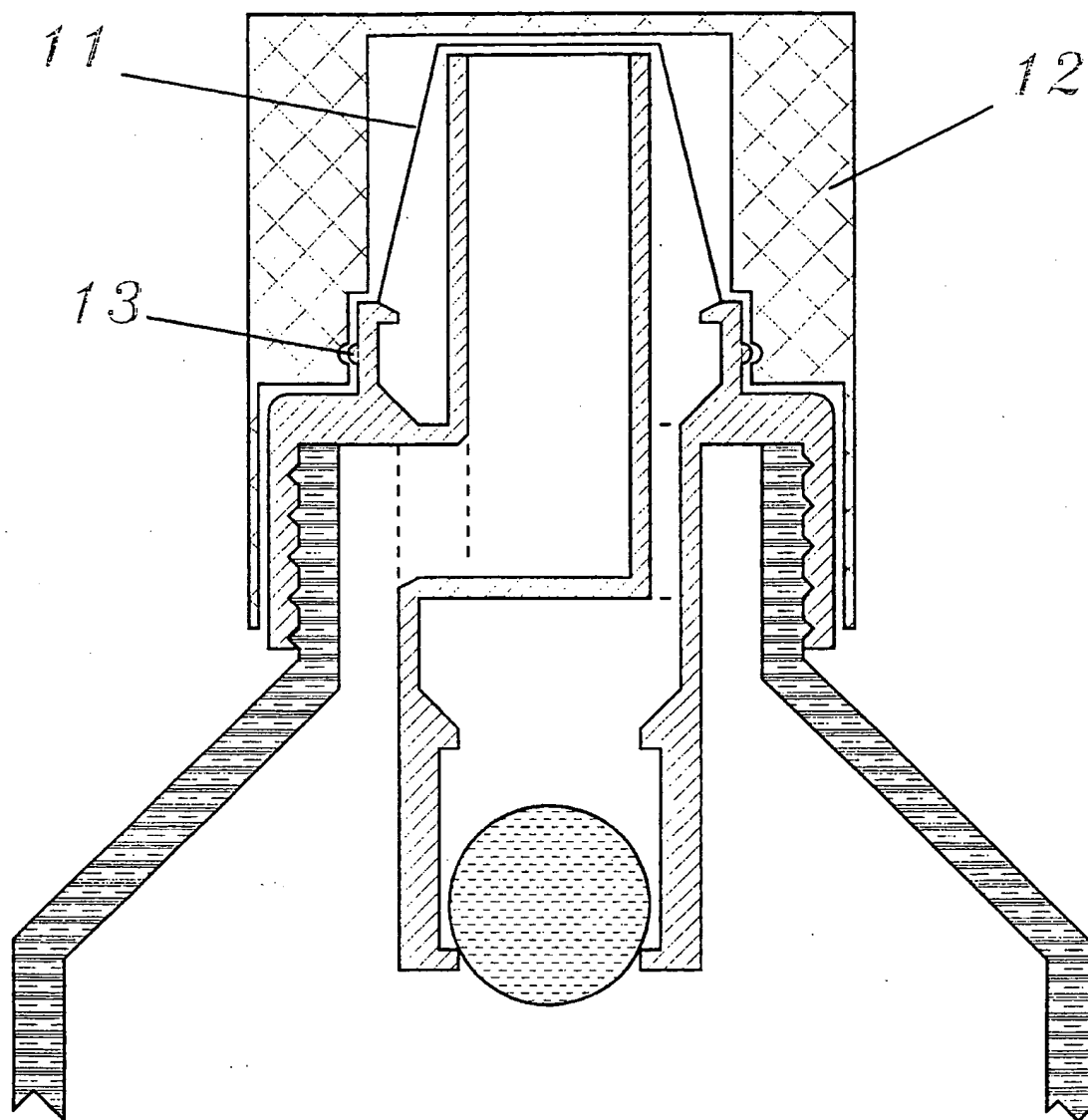
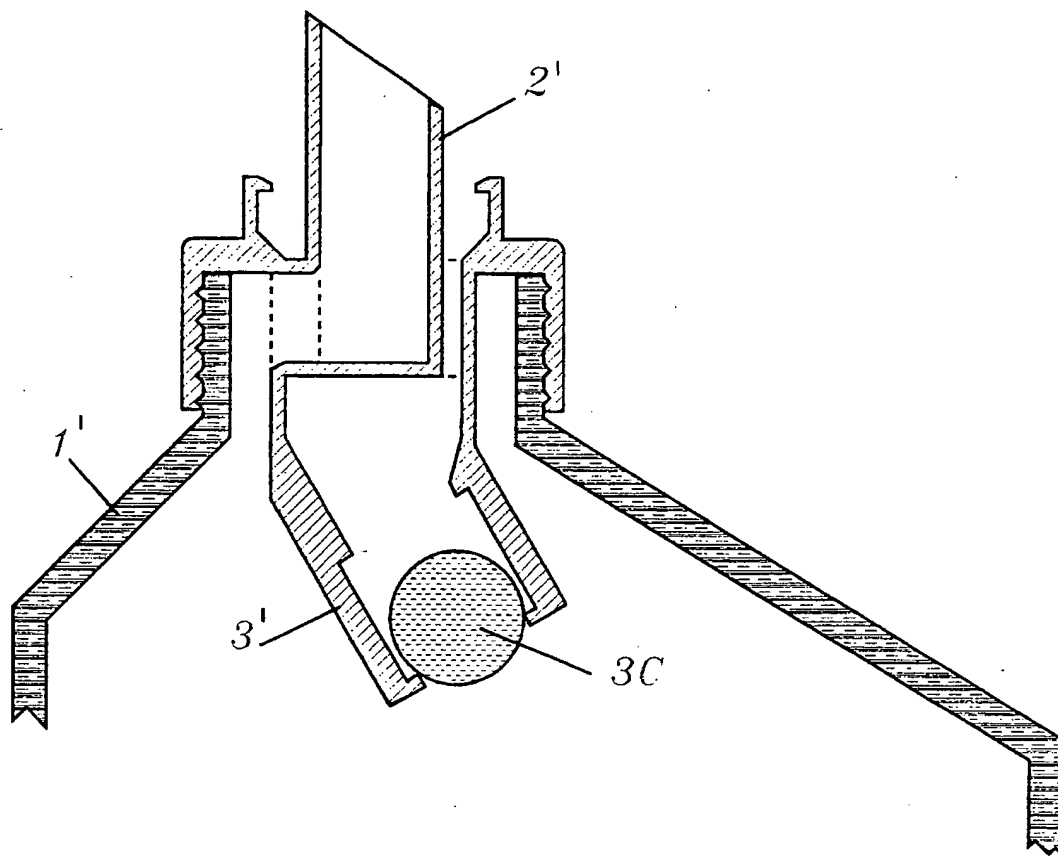


Fig 7

*Fig 8*

*Fig 9*

*Fig 10*

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 93/00961

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6: B65D 23/06, B65D 47/06, B65D 47/40

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6: B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, A, 3724723 (SLAVINSKI), 3 April 1973 (03.04.73) --	1-5
A	US, A, 1411775 (C.M. EVELETH), 4 April 1922 (04.04.22) --	1-5
A	US, A, 2221749 (H.A. ALLEN), 19 November 1940 (19.11.40) --	1-5
A	GB, A, 1579213 (CIBA-GEIGY AG), 12 November 1980 (12.11.80) --	1-5

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Date of the actual completion of the international search

20 June 1994

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 93/00961

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	FR, A1, 2539710 (CARNAUD KER-PLAS), 27 July 1984 (27.07.84) --	1-5
A	US, A, 1410889 (P. CARLSON), 28 March 1922 (28.03.22) --	1-5
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A	US, A, 2715480 (J.G. LIVINGSTONE), 16 August 1955 (16.08.55) --	1-5
A	US, A, 4696416 (MUCKENFUHS ET AL), 29 Sept 1987 (29.09.87) --	1-5
A	US, A, 4193519 (DUBACH ET AL), 18 March 1980 (18.03.80) -- -----	1-5

INTERNATIONAL SEARCH REPORT

Information on patent family members

28/05/94

International application No.

PCT/SE 93/00961

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US-A-	1411775	04/04/22	NONE		
US-A-	2221749	19/11/40	NONE		
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			DE-A-	2807204	24/08/78
			FR-A-	2382275	29/09/78
			JP-A-	53104379	11/09/78
			US-A-	4102476	25/07/78
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US-A-	1410889	28/03/22	NONE		
US-A-	725238	14/04/03	NONE		
US-A-	2715480	16/08/55	NONE		
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			JP-A-	61093061	12/05/86
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			GB-A-	1572759	06/08/80